STEAM News: Science at Home! 🔬🧪

A huge thank you to the families who have already tried some of our science experiments at home and sent me photos of their budding scientists in action! It has been wonderful to see students continuing their learning beyond the classroom and sharing their discoveries with me.

Following our recent STEM incursions with Nicky from Monash University, several students asked if I could send home all the experiments so they could try them with their families. Of course! Science is even more exciting when we can investigate, experiment and discover together.

Our students have been exploring kitchen chemistry, heat transfer, solar oven design and forensic science. Below are some activities to try at home, using everyday materials wherever possible.

Remember to **predict, observe, explain and ask questions** as you investigate. There is no need to get every prediction right — making discoveries is what science is all about!

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1. Kitchen Science Experiments 🧪

Experiment 1: Magic Milk

You will need:

- A shallow plate
- Full-fat milk
- Food colouring
- Dishwashing liquid
- Cotton buds

Step by step:

1. Pour enough milk into the plate to cover the bottom.
2. Add several drops of different food colourings.
3. Dip a cotton bud into a small amount of dishwashing liquid.
4. Gently touch the surface of the milk with the cotton bud near the food colouring.
5. Watch as the colours swirl and move across the plate.
6. Try touching different spots to see what happens.

The science: Dishwashing liquid interacts with the fats in milk and changes the surface tension, creating colourful movement.

Think about it: What happens if you use different amounts of food colouring or try a different type of milk?

Experiment 2: Oil and Water

You will need:

- A clear glass or plastic bottle
- Water
- Vegetable oil
- Food colouring
- A secure lid

Step by step:

1. Fill the bottle about one-third full with water.
2. Add a few drops of food colouring.
3. Slowly pour in vegetable oil, leaving some space at the top.
4. Secure the lid tightly.
5. Observe which liquid sits at the top and which sits at the bottom.
6. Gently turn the bottle upside down and back again.
7. Leave it to settle and observe what happens.

The science: Oil and water do not mix easily. Oil is less dense than water, so it floats on top.

Think about it: Does shaking the bottle make the liquids mix permanently? How long does it take for the layers to separate again?

Experiment 3: Baking Soda and Vinegar Balloon

You will need:

- A small plastic bottle
- Vinegar
- Baking soda
- A balloon
- A funnel

Step by step:

1. Pour a small amount of vinegar into the bottle.
2. Using a funnel, place 1–2 teaspoons of baking soda inside the balloon.
3. Carefully stretch the balloon over the bottle opening, keeping the baking soda inside the balloon.
4. Lift the balloon so the baking soda falls into the vinegar.
5. Watch the mixture fizz and the balloon inflate.
6. Describe what you observe before, during and after the reaction.

The science: Baking soda and vinegar react to produce carbon dioxide gas, which fills the balloon.

Think about it: What evidence tells you that a gas has been produced?

Safety: Never use a rigid, tightly sealed container. The balloon must be free to inflate.

Experiment 4: Dancing Raisins

You will need:

- A clear glass
- Sparkling water or fizzy lemonade
- A few raisins or sultanas

Step by step:

1. Fill the glass with sparkling water or fizzy lemonade.
2. Drop several raisins into the glass.
3. Watch carefully for bubbles forming around the raisins.
4. Observe whether the raisins rise, fall or move around the glass.
5. Wait a few minutes and record what happens.

The science: Carbon dioxide bubbles attach to the raisins and help lift them. When the bubbles pop at the surface, the raisins sink again.

Think about it: Do all the raisins move in the same way? What might happen if you use a different fizzy drink?

Please do not drink the experimental mixture.

Experiment 5: Invisible Lemon Juice Ink

You will need:

- Lemon juice
- White paper
- A cotton bud or small paintbrush
- A small bowl
- An adult to supervise heating

Step by step:

1. Pour a small amount of lemon juice into a bowl.
2. Dip the cotton bud or paintbrush into the juice.
3. Write a secret message or draw a picture on the paper.
4. Allow the paper to dry completely.
5. Ask an adult to carefully warm the paper using a suitable heat source, such as a warm iron on a safe setting.
6. Observe how the writing gradually becomes visible.

The science: Compounds in lemon juice can oxidise and turn brown when heated, making the writing easier to see.

Think about it: Why was the writing difficult to see before heating?

Safety: An adult must manage all heating. Keep paper away from flames and hot surfaces, and never let children heat the paper themselves.

Experiment 6: Ice Cream in a Bag

You will need:

- 1 cup of thickened cream
- 1 tablespoon of sugar
- A little vanilla essence
- A small sealable bag
- A larger sealable bag
- Ice
- About ½ cup of salt
- A tea towel or gloves

Step by step:

1. Place the cream, sugar and vanilla into the small bag and seal it securely.
2. Fill the larger bag about halfway with ice.
3. Add the salt to the ice.
4. Place the small bag inside the larger bag and seal it.
5. Wrap the larger bag in a tea towel or wear gloves.
6. Shake and gently massage the bag for approximately 10–15 minutes.
7. Carefully remove the small bag and wipe its outside clean.
8. Check whether the cream has thickened into ice cream.

The science: Salt lowers the freezing point of water, allowing the ice mixture to become colder. Heat transfers from the cream mixture to its surroundings, helping the cream freeze.

Think about it: Why do you think salt is added to the ice?

Use clean, food-safe equipment and ingredients if you intend to eat the ice cream. Adult supervision is recommended.

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2. STEM Design Challenge: Build a Solar Oven ☀️

During our STEM design challenge with Nicky from Monash University, students explored heat transfer and investigated how sunlight can be used to warm materials.

Your challenge: Can you design a simple solar oven that captures and traps the Sun's energy?

You will need:

- A cardboard pizza box or small cardboard box
- Aluminium foil
- Clear plastic wrap
- Black paper
- Tape
- Scissors
- A ruler
- A thermometer, if available
- A sunny outdoor space

Step by step:

1. Ask an adult to help cut three sides of a flap in the top of the cardboard box, leaving one side attached to create a reflector.
2. Cover the inside of the flap with aluminium foil, shiny side facing out, and secure it with tape.
3. Line the bottom of the box with black paper to absorb sunlight.
4. Cover the opening beneath the flap with clear plastic wrap, creating a window to help trap warm air.
5. Close the box and adjust the foil-covered flap so it reflects sunlight through the plastic window and into the box.
6. Place the oven in direct sunlight.
7. If you have a thermometer, measure the temperature inside the box and record it.
8. Wait 10–15 minutes and measure again.
9. Try changing the angle of the foil reflector or compare your results at different times of the day.

The science: Dark surfaces absorb light energy and convert it into heat. The foil reflects sunlight into the box, while the clear covering helps reduce heat escaping.

Think about it: Which design choices helped your oven warm up? What could you change to improve your design?

Safety: An adult must supervise construction and testing. Do not look directly at reflected sunlight. The inside of the oven may become hot, so do not touch hot surfaces or eat food heated in an untested homemade oven. Never leave it unattended.

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3. Forensic Science Investigations 🕵️

Our Year 5/6 students also explored forensic science during their Monash University incursion with Nicky. Forensic scientists examine evidence, look for patterns and use observations to help solve mysteries.

Here are some simple ways to continue investigating at home.

Experiment 7: Fingerprint Detectives

You will need:

- White paper
- A soft pencil
- Clear sticky tape
- A magnifying glass, if available

Step by step:

1. Use the pencil to shade a small patch of paper until it is dark.
2. Gently rub a fingertip over the shaded patch to collect graphite.
3. Press the graphite-covered fingertip onto a clean piece of paper.
4. Carefully place a piece of clear sticky tape over the print.
5. Lift the tape and place it onto white paper.
6. Examine the fingerprint and look for patterns such as loops, arches and whorls.
7. Compare prints from different fingers and look for similarities and differences.

The science: Fingerprints have distinctive ridge patterns. Forensic scientists can examine these patterns as one type of evidence.

Think about it: Are all your fingerprints identical? What patterns can you identify?

Avoid collecting or sharing other people's fingerprints without their permission.

Experiment 8: Chromatography — Mystery Marker Colours

You will need:

- White paper towel or coffee filter paper
- Washable, water-based markers
- A clear glass
- A small amount of water
- A pencil

Step by step:

1. Cut a strip of paper towel or filter paper.
2. Draw a thick dot or short line with a washable marker about 2 cm from the bottom of the strip.
3. Pour a small amount of water into the glass.
4. Suspend the paper strip so that only the bottom edge touches the water. Keep the marker dot above the waterline.
5. Watch as the water travels up the paper.
6. Observe whether the marker separates into different colours.
7. Remove the strip before the water reaches the top and allow it to dry.
8. Repeat with different marker colours and compare the results.

The science: Chromatography separates pigments because different substances travel through the paper at different rates.

Think about it: Does a black marker contain only black pigment? Which colours separate most clearly?

Experiment 9: Solve a Mystery!

You will need:

- Three or four small household objects
- Paper and pencil
- A family member to create a mystery

Step by step:

1. Ask a family member to set up a simple mystery using a few objects or written clues.
2. Examine the scene carefully without moving anything at first.
3. Record what you can see, including shapes, colours, positions and other details.
4. Write down possible explanations for what happened.
5. Identify which clues support each explanation.
6. Ask questions or collect additional clues if needed.
7. Present your conclusion and explain how the evidence supports your theory.

The science: Forensic scientists use careful observations, evidence and logical reasoning to investigate events. They must distinguish between what they know and what they think might have happened.

Think about it: Which clue was most useful? Could there be another explanation?

Become a Family of Scientists!

For each experiment, try using these four steps:

1. **Predict:** What do you think will happen?
2. **Observe:** What can you see, hear or measure?
3. **Explain:** What scientific idea might explain your results?
4. **Improve:** What could you change or test next time?

You could record your findings in a family science journal, draw what happened or take photographs of each stage.

Please remember that children must be supervised by an adult throughout these activities. Use materials as directed, avoid tasting experimental mixtures, and ensure an adult manages any heating or cutting. Wash hands and clean up your workspace when finished.

Finally, thank you again to the families who have already sent through photos of their experiments. I absolutely love seeing our students' enthusiasm for science and their willingness to keep investigating outside school!

If you try any of these activities, **please send me your photos**. I would love to see your creations, discoveries and inventive ideas.

Happy experimenting, everyone!

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